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Natural History Observations of the Common Gartersnake, *Thamnophis sirtalis*, from Northwest Pennsylvania

Brian S. Gray
Natural History Museum at the Tom Ridge Environmental Center
301 Peninsula Drive
Erie, PA 16505
brachystoma@hotmail.com

Abstract

Common Gartersnakes, *Thamnophis sirtalis*, were studied using mark–recapture techniques at a site in Erie, Pennsylvania. Snout–vent length (SVL) and total length (TL) did not differ significantly between juvenile male and female *T. sirtalis*. However, compared to juvenile females, juvenile males did have significantly longer relative tail lengths (tl/TL). Mass was also similar between juvenile males (mean 4.4 g) and juvenile females (mean 6.5 g). Adult female *T. sirtalis* averaged larger in SVL, TL, and mass. Adult males averaged greater values for tl/TL. The sex ratio of adult males to females did not differ from 1:1; nor did the ratio of juveniles to adults. The population size was estimated to be 241 ± 216 *T. sirtalis*, resulting in a density of 482/ha for the area of utilized habitat and a biomass density of 13.5 kg/ha. Observations regarding surface body temperatures, aggregations and site fidelity, defensive behaviors, and tail loss frequency of *T. sirtalis* at the study site are also reported.

Introduction

The Common Gartersnake, *Thamnophis sirtalis* is a medium sized natricine snake (to 123.8 cm total length [Conant and Collins, 1998]) that can be found in numerous habitats across North America. It has been reported to be the most commonly encountered species of snake in the Northeast (Klemens, 1993; Hulse et al., 2001), including northwest Pennsylvania (McKinstry and Felege, 1974; McKinstry and Cunningham, 1980; Gray and Lethaby, 2008). It is frequently encountered in urban settings and is able to thrive there (Hulse et al., 2001; Gibbs et al., 2007). As a result of these qualities, *T. sirtalis* is the snake most used in behavioral experiments, and has been studied in the field extensively (Rossman et al., 1996). It has been noted that in Pennsylvania basic natural history data is lacking for many species of amphibians and reptiles, including *T. sirtalis* (Hulse et al., 2001). Such data as seasonal activity and population size and structure are useful when preparing conservation management plans for snake species (Dodd, 1993; Meshaka, 2009). In the past several years a number of papers have focused on this issue and much has been added to our knowledge of *T. sirtalis* in Pennsylvania (Meshaka, 2009; Meshaka et al., 2012) and snake assemblages in which this species occurs (Meshaka, 2010a; Meshaka and Delis, 2014). Data from Erie County, Pennsylvania, *T. sirtalis* include reports on abnormalities (Gray et al., 2001; Gray et al., 2003), seasonal activity (Gray, 2011, 2014b), diet (Gray, 2002, 2012), and temperature relationships (Gray, 2014b).

The goals of the present study were to gather site-specific data regarding the population size and structure, and natural history of *T. sirtalis*. I also wanted to summarize the defensive behaviors of free-ranging *T. sirtalis* at the Erie, Pennsylvania, site. Such data fill a gap in our understanding of urban populations of *T. sirtalis* in Pennsylvania.

Materials and Methods

Utilized habitat at the study site consisted of approximately 0.5 ha of vegetated slope along the State Highway (Hwy) 832 Bridge in Erie County, Pennsylvania, and was described by Gray (2014a). An additional 3.25 ha of palustrine forest to the west was possibly used by snakes but not sampled. Snake species known to occur at the site include Milksnake, *Lampropeltis triangulum*, Dekay's Brownsnake, *Storeria dekayi*, and Common Gartersnake, *Thamnophis sirtalis*. The Red-bellied Snake, *S. occipitomaculata*, and Short-headed Gartersnake, *T. brachystoma*, have been reported from adjacent property (Gray, 2007, 2009). *Thamnophis sirtalis* were located by searching pre-existing debris (i.e., wooden paneling, shingles, linoleum, and carpeting) at the site. Debris along the Hwy 832 site was searched 1–4 times a week with observations being made in the morning (40 visits between 0615 and 1200 hrs) and in the late afternoon (32 visits between 1626 and 1938 hrs) between 11 March and 2 October 2014. Debris items were quickly turned, and if a snake was present, its surface body temperature (T_s) was immediately recorded with a hand-held non-contact infrared thermometer (Raytec MT-6) precise to 0.2 °C (accuracy of ±1% from 10 to 30 °C, and ±1.5% outside this range). The thermometer was held approximately 200 mm from the snake and in line with the snake's body axis (Hare et al., 2007). At a distance of 200 mm, a circular area of approximately 20 mm in diameter is sampled. To lessen the likelihood of obtaining readings of both snake and substrate, only snakes that were coiled were utilized in the analysis of temperature data. When two or more snakes were found beneath the same cover object, not necessarily in contact, they were considered to be aggregated. Air temperature at the site was obtained with a Lascar Electronics temperature data logger (model EL-USB-1) with an accuracy of ± 1 °C placed 1 m above ground in a shaded area. The temperature data logger was set to record a reading every 0.5 h.

Defensive behavior observations were made and divided into three sequential phases. During the initial phase, snakes were observed for 10 seconds after measuring their T_s. The initial phase was followed by the contact phase, which involved the snake being gently tapped near mid-body with the investigator's open hand, then observed for an additional 10 seconds. After the

Figure 1. A *Thamnophis sirtalis* in a defensive posture with the head elevated off the substrate and the neck in an s-curve. The snake is also slightly dorsoventrally flattened.

Figure 2. A dorsoventrally flattened *Thamnophis sirtalis*. The snake depicted had a surface body temperature of 2.4°C and its movements were slow.

tap the open hand was held approximately 100 mm from the snake. The human hand has been demonstrated to be an effective stimulus for eliciting defensive responses in snakes (Keogh and DeSerto, 1994). During the capture phase the snake was grabbed as near to midbody as possible and observed in hand for a final 10 seconds. Any defensive behaviors or lack thereof were noted during each phase. Because some individuals attempted to flee, not all phases were observed or were not observed for their entirety. For example, several snakes attempted to flee during the initial phase and were then captured, thereby skipping the contact phase. Other snakes attempted to flee immediately after being tapped, thus abridging the contact phase. Possible defensive behaviors were defined as follows:

• *Biting*—The snake strikes with an open mouth and its teeth make contact with the investigator's hand.
• *Closed-mouth strike*—From a defensive posture (defined below) the snake thrusts its head towards the investigator with a closed mouth, but does not make contact.
• *Defensive posture*—The snake has its head off the substrate with the neck in an S-curve and aimed towards the investigator. The body is usually coiled but may be in a series of S-curves (Figure 1).
• *Dorsoventral flattening*—The snake spreads its ribs while simultaneously lowering its back, giving the snake a ribbon-like appearance (Figure 2).
• *Fleeing*—The snake moves from where it was initially observed; usually, but not necessarily, away from the investigator.
• *Gaping*—From a defensive posture the snake opens its mouth with the head towards the investigator, but not striking (i.e., there is no forward motion) (Figure 3).
• *Head-hiding*—The snake places its head beneath coils of the body and/or tail (Figure 4).
• *Open-mouth strike*—From a defensive posture the snake thrusts its head towards the investigator with an open mouth but does not make contact (Figure 5).
• *Remained in place*—A collective term for all behaviors whereupon the snake made no attempt to flee. Unlike remaining still, the snake may display some movement (e.g., coiling, head-hiding).
• *Smearing cloacal contents*—The snake presses its vent against its body or the investigator's hand while releasing and smearing the contents of the cloaca and musk from the anal scent glands.
• *Still*—The snake remains motionless and does not move from its original position.

Figure 3. A gaping *Thamnophis sirtalis*. The snake in this image is also in a defensive posture and puffed up.

Figure 4. A *Thamnophis sirtalis* exhibiting head-hiding behavior. During this behavior the snake may also smear cloacal contents on itself.

Figure 5. A *Thamnophis sirtalis* during an open-mouth strike.

After the completion of the capture phase, each snake was sexed; its snout–vent length (SVL) and total length (TL) measured to the nearest mm by gently stretching along a ruler. Mass was obtained to the 0.1 g with a spring scale. Sex of mature *T. sirtalis* was determined by examining the base of the tail. In males the hemipenes cause the sides of the base of the tail to bulge, whereas in females, the base of the tail is more tapered (Rossman et al., 1996). In male neonates and young ca. 150 mm or less, the hemipenes were manually everted by grasping the snake at mid-tail and rolling the thumb on the ventral surface towards the cloaca. All snakes that were captured were uniquely marked with a portable cautery unit (Winne et al., 2006) and released at the site of capture. As per Hulse et al. (2001), males that were at least 270 mm SVL, and females that were at least 360 mm SVL were considered adults.

Descriptive statistics include the mean ± 95% confidence interval, range, and sample size. I used Student's *t*-tests (two-tailed) to compare means. *F*-tests were used to determine whether or not variances between samples were homogenous. If variances differed significantly, *t*-tests assuming unequal variances were used and are indicated with asterisks. I used adjusted *G*-tests to analyze sex ratios and juvenile to adult ratios as well as compare frequencies between phases (Fowler et al., 1998). Chi-square tests employing Yates's correction (Fowler et al., 1998) were used to compare the frequency of select defensive behaviors (e.g., biting) between the contact and capture phases. For the comparison between the responses during the initial and contact phases, snakes were classified as either remaining in place (i.e., all responses except fleeing) or fleeing, thus the number of behaviors in each phase equals the number of snakes involved. Conversely, in the general summary of defensive responses, each snake could display more than one behavior during any of the three phases. Therefore, the number of observed responses is equal to or greater than the number of individual snakes. Population size (N) was estimated using the Schumacher-Eschmeyer method (Ricker, 1975; Schneider, 1998). For the population estimate each sample consisted of a monthly sampling period. Only data prior to the observation of the first neonate(s) or postpartum female were utilized to reduce the likelihood of violating the assumption of no births. Density estimates (i.e., number of snakes per hectare) were calculated for utilized habitat (N/0.5) and for total habitat (N/3.75). Two biomass density estimates were calculated by multiplying the average mass of snakes by N, then dividing by the area of utilized habitat and total habitat, respectively.

Results

Of 62 *T. sirtalis* marked, 47 (76%) were captured once, 12 (19%) twice, 1 (2%) three times, and 2 (3%) four times. In addition, four neonates were captured but not marked.

Morphometrics of juveniles—Snout–vent length (SVL) did not differ (t = -0.75, df = 29, P = 0.457) between juvenile males (mean = 192 ± 29 mm, range = 133–258, n = 12) and juvenile females (mean = 208 ± 31 mm, range = 132–346, n = 19). Total length (TL) did not differ (t = -0.56, df = 29, P = 0.578) between juvenile males (mean = 249 ± 38 mm, range = 173–330, n = 12) and juvenile females (mean = 264 ± 40 mm, range 168–439, n = 19). Relative tail length (tl/TL) differed (t = 3.56, df = 29, P = 0.001) between juvenile males (mean = 0.23 ± 0.006, range = 0.21–0.24, n = 12) and juvenile females (mean = 0.21 ± 0.006, range = 0.19–0.24, n = 19), with males averaging greater tl/TL. Mass did not differ (t^* = -1.47, df = 27, P = 0.153) between juvenile males (mean = 4.4 ± 1.6 g, range = 1.4–8.5, n = 12) and juvenile females (mean = 6.5 ± 2.6 g, range = 1.4–21.0, n = 19).

Morphometrics of adults—Snout–vent lengths differed (t = -3.43, df = 33, P = 0.002) between adult males (mean = 370 ± 26 mm, range = 275–454, n = 19) and adult females (mean = 429 ± 25 mm, range = 381–572, n = 16), with adult females averaging larger SVLs. Total length differed (t^* = -2.27, df = 21, P = 0.03) between adult males (mean = 482 ± 44 mm, range = 355–596, n = 15) and adult females (mean = 534 ± 22 mm, range = 482–583, n = 14), with females averaging larger TLs. Relative tail length differed(t^* = 7.02, df = 23, $P < 0.0001$) between adult males (mean = 0.241 ± 0.007, range = 0.22–0.26, n = 15) and adult females (mean = 0.214 ± 0.004, range = 0.20–0.23, n = 14), with males averaging greater tl/TL. Mass differed (t^* = -3.44, df = 21, P = 0.002) between adult males (mean = 27.1 ± 5.0 g, range = 10.5–46.0, n = 19) and adult females (mean = 46.8 ± 11.1 g, range = 28.8–109.0, n = 16), with females averaging greater mass.

Sex ratios and juvenile to adult ratios—Total sex ratio of juvenile males (n = 12) to juvenile females (n = 19) (1:1.58) did not differ significantly from 1:1 (G_{adj} = 1.56, df = 1, $P > 0.05$). The total sex ratio of adult males (n = 19) to adult females (n = 16) (1:0.84) did not differ significantly from 1:1 (G_{adj} = 0.25, df = 1, $P > 0.05$). The total ratio of juveniles (n = 31) to adults (n = 35) did not differ significantly from 1:1 (G_{adj} = 0.24, df = 1, $P > 0.05$). The juvenile to adult ratio during spring (1:0.94) did not differ significantly from a 1:1 ratio (G_{adj} = 1.97, df = 1, $P > 0.05$). The juvenile to adult ratio during summer (1:1.64) did not differ significantly from a 1:1 ratio (G_{adj} = 2.18, df = 1, $P > 0.05$).

Population size and density - A total of 57 *T. sirtalis* were utilized in the estimation of population size. Using the Schumacher-Eschmeyer method, population size was estimated as 241 ± 216 *T. sirtalis*. Density in utilized habitat was estimated as 482 ± 432 *T. sirtalis*/ha, resulting in a biomass density

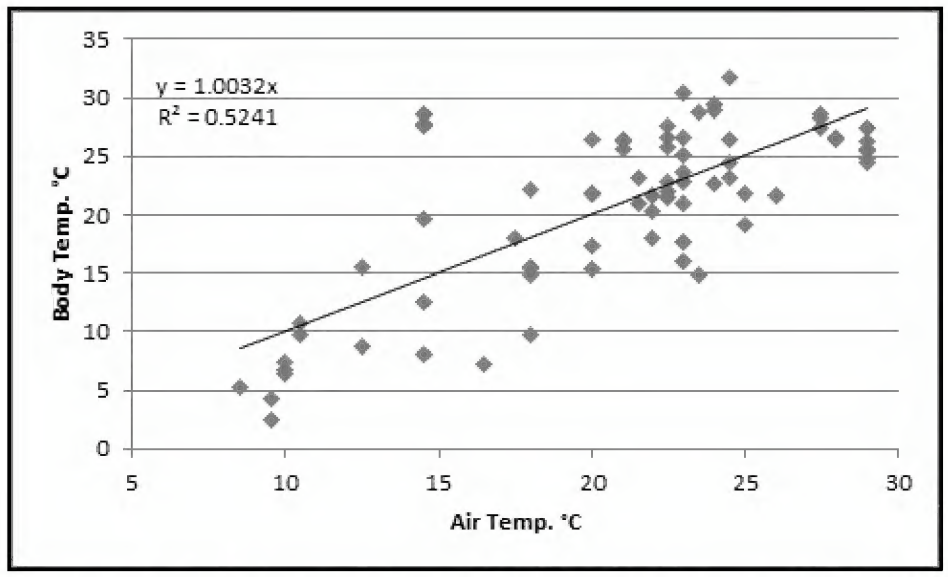

Figure 6. The relationship between surface body temperatures (T_s) of *Thamnophis sirtalis* and air temperatures at the Hwy 832 site during 2014.

of 13.5 ± 12.1 kg/ha. Density for the total area of the site was estimated as 64 ± 57 *T. sirtalis*/ha, resulting in a biomass density of 1.8 ± 1.6 kg/ha.

Body temperatures—Surface body temperatures (T_s) of male (mean = 20.8 ± 2.4° C, range = 2.4–29.4, n = 40) and female *T. sirtalis* (mean = 21.1 ± 2.4° C, range = 4.2–31.8, n = 37) were similar (t = -0.18, df = 75, P = 0.855). There was a positive correlation between T_s and AT ® = 0.72) and this correlation was significant (ANOVA F = 83.32, df = 1, 75, $P < 0.001$) (Figure 6).

Aggregations and site fidelity—Aggregations of *T. sirtalis* were observed on 18 occasions, with the largest consisting of 12 neonates found 18 August 2014. *Thamnophis sirtalis* were observed in association with *S. dekayi* on six occasions and *L. triangulum* once (Table 1). The most frequently observed interspecific aggregations involved a single *T. sirtalis* with two *S. dekayi* (n = 3).

Site fidelity was observed in 5 males and 2 females. In 3 instances a single cover object was utilized by a snake on 2 occasions. There were 4 instances involving a single cover object being utilized by a snake on 3 occasions. Three male *T. sirtalis* displayed site fidelity for a cover object during pre-ecdysis (i.e., while opaque) on 2 occasions each. The longest interval of time between same cover object usages, as indicated by captures, was 21 days. Two male *T. sirtalis* inadvertently released ca. 115 m from their initial capture site, returned to their original cover objects in 15 and 25 days, respectively.

Table 1. Summary of conspecific and interspecific aggregations of *Thamnophis sirtalis*.

Thamnophis sirtalis	*Storeria dekayi*	*Lampropeltis triangulum*	Frequency
3	0	0	3
1	2	0	3
3	2	0	1
2	1	0	1
2	0	0	4
1	1	0	2
4	0	1	1
1	4	0	1
8	0	0	1
12	3	0	1

Defensive behaviors—Twenty-eight male and 34 female *T. sirtalis* provided 39 and 37 observations of defensive behavior, respectively. The initial phase had the lowest diversity of defensive behaviors (n = 6), with attempting to flee being the most commonly observed (n = 34) response (Table 2). There were no defensive behaviors that were exclusive to the initial phase. The surface body temperature (T_s) of snakes that did not flee (mean 19.1 ± 2.6° C, range = 2.4–31.8, n = 40) was significantly lower (t* = -3.44, df = 60, P = 0.001) than those that attempted to flee (mean = 24.4 ± 1.4° C, range = 14.8–31.8, n = 36) during the initial phase. *Thamnophis sirtalis* fled significantly more often (χ^2 = 5.78, df = 1, $P < 0.05$) during the initial phase than during the contact phase.

The contact phase had the greatest diversity of defensive behaviors (n = 9), with dorsoventrally flattening the body (n = 16), and attempting to flee (n = 16) being the most common responses. Head-hiding and puffing up were exclusive to the contact phase. Among 29 observations of *T. sirtalis* (14♂:15♀) during the contact phase, 12 (41%) were of snakes that remained in place, whereas 17 (59%) attempted to flee. The T_s of snakes that did not flee (mean = 12.5 ± 4.1 °C, range = 5.2–27.8, n = 12) was significantly lower (t = -4.68, df = 27, $P < 0.0001$) than those that attempted to flee (mean = 22.4 ± 2.5 °C, range 9.8–28.8, n = 17) during the contact phase.

Thamnophis sirtalis remained still significantly less often (χ^2 = 22.78, df = 1, $P < 0.01$) during the contact phase than during the initial phase. However, the proportion of *T. sirtalis* remaining in place and those that attempted to flee did not differ significantly (G_{adj} = 1.05, df = 1, $P > 0.05$) between phases.

Seven defensive behaviors were observed during the capture phase, with smearing of the cloacal contents being the most

Table 2. Summary of defensive behaviors of *Thamnophis sirtalis* by phase. An X indicates the behavior was observed during the respective phase. The number of observations for each behavior is within parentheses.

Behavior	Initial	Contact	Capture
Biting		X (2)	X (15)
Defensive posture	X (2)	X (9)	X (6)
Flattening	X (5)	X (16)	X (9)
Fleeing	X (34)	X (16)	
Gaped	X (2)	X (2)	X (2)
Head-hiding		X (2)	
Smearing cloacal contents			X (58)
Open-mouth strikes	X (3)	X (9)	X (5)
Puffed up		X (1)	
Still	X (30)	X (2)	
Struggled			X (11)

commonly observed (n = 58) response. *Thamnophis sirtalis* bit significantly more often ($\chi^2 = 8.47$, $df = 1$, $P < 0.01$) during the capture phase than during the contact phase (Table 2). Struggling and smearing of the cloacal contents were exclusive to the capture phase.

Twenty-seven unique sequences of defensive behavior were documented, with the most commonly observed (n = 21) consisting of snakes initially fleeing, thereby skipping the contact phase, and then struggling and smearing cloacal contents during the capture phase. The second most common defensive sequence (n = 6) consisted of snakes remaining still during the initial phase, fleeing during the contact phase, then struggling and smearing cloacal contents during the capture phase. Of 9 *T. sirtalis* that were observed two or more times, seven displayed a different sequence during each encounter; two *T. sirtalis* repeated one or more sequences (Table 3).

Tail loss and mortality—Stub tails were observed in 13% (n = 4) of male and 6% (n = 2) of female *T. sirtalis*. No mortality was observed at the site during 2014. However, a DOR adult *T. sirtalis* was found ca 300 m south of the site.

Discussion

Morphometrics of juveniles—Sexual size dimorphism at hatching is rare among snakes (Shine, 1993). Crews et al. (1985) noted differences in body size between sexes within 3 weeks of birth among *T. s. parietalis*. Furthermore, in *T. s. parietalis* male growth is inhibited by testicular androgens, resulting in relatively smaller body and head (i.e., jaw length) sizes when compared to females (Crews et al., 1985; Shine and Crews, 1988). It is likely that this occurs at the Hwy 832 site as well, and would explain the observed differences in sexual size dimorphism between juveniles and adults. Sexual dimorphism in SVL and TL at the Hwy 832 site is more pronounced in adult *T. sirtalis* than in juveniles. A similar result was observed in a sympatric population of *Storeria dekayi*, in which SVL and TL did not differ significantly between sexes in juveniles, but was significantly different in adults, with females averaging larger in both characters (Gray, 2014a).

Morphometrics of adults—The results of this study were similar to previous reports of adult females being larger in both SVL and TL, and in having relatively smaller tails, and being more massive than males (Harding, 1997; Hulse et al., 2001; Ernst and Ernst, 2003). Average SVL and TL of adult *T. sirtalis* vary regionally and between individual sites within a given region. For example, body size of *T. sirtalis* varied significantly among eight island and three mainland sites in the Lake Erie region (King, 1989a). Adult *T. s. pallidulus* on Georges Island, Nova Scotia, are slightly smaller than adults in mainland populations (Barnes et al., 2006). Hulse et al. (2001) reported that adult males from Pennsylvania averaged 337.6 mm SVL and 444.5 mm TL, which is smaller than males at the Hwy 832 site. Conversely, Pennsylvania female *T. sirtalis* averaged 439.0 mm SVL and 550.3 mm TL (Hulse et al., 2001), larger than female *T. sirtalis* at the Hwy 832 site. In a sample of *T. sirtalis* from southern New England (Klemens, 1993), 33 males (396.4 mm SVL, 522.7 mm TL) and 65 females (499.8 mm SVL, 633.2 mm TL) averaged larger than both Pennsylvania samples. Ontario male *T. sirtalis* averaged 520 mm TL, whereas females averaged 560 mm TL (Freedman and Catling, 1978). Variation in average size of *T. sirtalis* may also vary from year to year at a given site (Fitch, 1999). Body size in snakes can be influenced by many variables including length of the active season, average temperature, availability and quality of basking sites, and availability and quality of food. King (1989b) offered possible explanations for the evolution of sexual dimorphism in relative tail length, including males requiring longer tails to house the hemipenes and associated muscles, or sexual selection for courtship success, or in the case of females, fecundity selection favoring more posterior placement of the vent.

Sex ratios and juvenile-to-adult ratios—Sex ratios of *T. sirtalis* may vary geographically. Dunlap and Lang (1990) demonstrated that sex ratio of clutches varied with female body size in *T. sirtalis*, with large females producing more males, and small females producing female-biased clutches. The sex ratio of an Ontario population studied by Freedman and Catling (1978) did not differ significantly from 1:1. The total male to female ratio of a Nova Scotia population of *T. s. pallidulus* was 0.8:1.0 (Barnes et al., 2006) and similar to the results of the present study. The ratio of male to female *T. sirtalis* from southern New England (Klemens, 1993), Western (Meshaka, 2010b) and south-central Pennsylvania (Meshaka and Delis, 2014) were female-biased. In Klemens's sample there were nearly twice as many females as males. Klemens (1993) considered this to be a highly disparate ratio compared to his collections of other snake species.

In contrast to the present study, the population of *T. sirtalis* at the Hwy 832 site was previously reported to be juvenile-biased during April–May, and July–September (Gray, 2014b). Apparently, such ratios may differ from year to year. Freezing may be a significant cause of winter mortality in northern populations of *T. sirtalis* (Shine and Mason, 2004). The winter of 2013–2014 at Erie, Pennsylvania, was colder than usual; average air temperature for the period 1 December 2013–28 February 2014 was 24.4°F, and was nearly 5°F below the normal average (NOAA, 2015). The harsh winter may have proven more detrimental to juvenile than adult *T. sirtalis*, causing the observed differences in ratios between studies. A decrease in population size of a sympatric population of *S. dekayi* at the Hwy 832 site during 2013–2014 was likely also due to overwinter mortality (Gray, unpubl. data). At other sites in Pennsylvania adults reportedly may greatly outnumber juveniles (Meshaka, 2009; 2010b; Meshaka et al., 2012).

Population size and density—The 95% confidence interval in the present study was relatively large due to low number of recaptures. However, since 62 *T. sirtalis* were marked, it is reasonable to assume the population size is at least equal to the number of marked individuals. Population size of an Ontario population was estimated using 4 methods and ranged from 144 to 170 individuals (Freedman and Catling, 1978). Density estimates for gartersnakes are relatively high in comparison with most other snakes, which exist at less than 1 individual/ha (Rossman et al., 1996). On Georges Island, Nova Scotia, density for a population of *T. sirtalis* was reported as 120 individuals/ha (Barnes et al., 2006), and was the highest density reported for

Table 3. Summary of the defensive behaviors of snakes with multiple captures. An X indicates that the contact phase was skipped. Snakes with repeated defensive sequences are indicated with an asterisk.

Snake	Date	Initial	Contact	Capture
017 ♀	11 May	fled	X	smeared cloacal contents
	18 May	still	flattened defensive posture open-mouth strikes	smeared cloacal contents
018 ♀	13 May	still	fled	smeared cloacal contents
	30 May	still	flattened biting fled	smeared cloacal contents
019* ♂	13 May	still	fled	smeared cloacal contents
	29 May	still	fled	smeared cloacal contents
	7 June	fled	X	flattened defensive posture open-mouth strikes smeared cloacal contents
	28 June	fled	X	smeared cloacal contents
020 ♂	13 May	still	still	smeared cloacal contents
	29 May	still	defensive posture flattened open-mouth strikes	smeared cloacal contents biting
029 ♀	30 May	fled	X	smeared cloacal contents
	14 June	still	fled	smeared cloacal contents
032 ♂	7 June	fled	X	smeared cloacal contents
	12 June	fled	X	defensive posture biting smeared cloacal contents
035 ♀	13 May	still	flattened defensive posture open-mouth strikes	biting smeared cloacal contents
	18 May	still	flattened fled	smeared cloacal contents
044 ♂	4 July	still fled	X	struggled smeared cloacal contents
	22 July	still	fled	smeared cloacal contents
045* ♂	4 July	still fled	X	smeared cloacal contents
	25 July	fled	X	smeared cloacal contents
	1 August	fled	X	smeared cloacal contents

the species prior to the present study. While the density estimate for *T. sirtalis* in utilized habitat in the present study was relatively high (482/ha), that for the total area (64/ha) was similar to the estimated 45–89 *T. sirtalis*/ha in Ohio (Reichenbach and Dalrymple, 1986) and 7.4–44.5/ha in Kansas (Fitch, 1999). In Ontario, Freedman and Catling (1978) reported a density of 4/ha for the total site, and 20/ha within the area of actual occurrence. Biomass for the Ohio population studied by Reichenbach and Dalrymple (1986) was estimated to range from 2.8 to 5.5 kg/ha, comparable to those reported for the total area in the present study.

The high density of *T. sirtalis* at the Hwy 832 site may partly be explained by the abundance of prey, shelter, and suitable hibernacula. Several amphibian species, including Spotted Salamanders (*Ambystoma maculatum*), American Toads (*Anaxyrus americanus*), Gray Treefrogs (*Hyla versicolor*), Green Frogs (*Lithobates clamitans*), Pickerel Frogs (*L. palustris*), and Spring Peepers (*Pseudacris crucifer*) are known prey of *T. sirtalis* (Ernst and Ernst, 2003; Gray, 2012), and are found in the adjacent palustrine wetland. Several earthworm species (*Allolobophora chlorotic*a, *Aporrectodea* sp., *Lumbricus rubellus*, *L. terrestris*, and *Amynthas diffringens*) are also found at the site.

Body temperatures—Being ectotherms, the body temperatures of snakes are constrained by the range of thermal conditions present in the environment (Peterson et al., 1993). Gray (2014b) reported that body temperatures of *T. sirtalis* were significantly correlated to both air and substrate temperatures. Thus, the significant positive correlation between air and body temperatures observed in the present study was not unexpected. Voluntary body temperatures of *T. sirtalis* range from 9 to 35°C (Costanzo et al., 1990), however, most are active at 18–30°C (Aleksiuk, 1976). Surface body temperatures of *T. sirtalis* in the present study were similar to those reported by Costanzo et al. (1990).

Aggregations and site fidelity—Snakes may aggregate for any number of reasons including, shelter and protection from predators, a reduction in the rate of water loss, an increased chance of mating, or selection of a thermally optimal basking site (Noble and Clausen, 1936; Gillingham, 1987; Gregory et al., 1987; Rossman et al., 1996; Vitt and Caldwell, 2009). The aggregation of neonates may decrease predation rates of individual snakes (Ford and Burghardt, 1993). Aleksiuk (1977) described cold-induced aggregative behavior in 150–200 *T. s. parietalis*, and suggested the behavior reduced the rate of cooling. The aggregations observed in the present study are unlike those observed by Aleksiuk (1977) in that they consisted of relatively small numbers, were not in the open, and the snakes were not always in contact with one another. Hulse et al. (2001) noted that as many as six *T. sirtalis* were found under a single rock. Meshaka (2010b) noted that at Powdermill Nature Reserve in western Pennsylvania mixed groups of male and female *T. sirtalis* were most numerous in June. In my study there were too few instances (n = 6) of male-female groups to determine a trend in seasonal variation. Two of the male-female aggregations contained a pair of adult snakes (13 May and 7 June), the other included a pair of adult snakes with a juvenile male and an unsexed adult (4 July). Mixed aggregations of *T. sirtalis* and *S. dekayi* at this site were previously reported, and included nineteen occasions, with most (n = 7) involving a single *T. sirtalis* with a single *S. dekayi* (Gray, 2013). Due to the ophiophagous nature of juvenile milksnakes, I expected there to be very few observations of *Lampropeltis* and *Thamnophis* aggregating together. Juvenile *L. triangulum* are known predators of snakes, including *T. sirtalis* (Ernst and Ernst, 2003). Although *L. triangulum* at the Hwy 832 site have only been known to predate *S. dekayi* (Gray, 2014a), it would be of survival value for at least juvenile *T. sirtalis* to avoid cover objects frequented by milksnakes.

It has been demonstrated that *Thamnophis sirtalis* has advanced navigational abilities (Lawson, 1994). Larsen (1987) reported movements of 3.75 km from a hibernaculum to a freshwater marsh in Alberta. In autumn snakes returned to the hibernaculum. Site fidelity was also reported by Fitch (1999) at a site in Kansas, where 32 (5.35%) of 600 recaptures coincided with the site of a previous capture of the same individual.

Defensive behaviors—Herzog and Burghardt (1986) demonstrated significant differences in defensive behaviors among three species of *Thamnophis*, with *T. melanogaster* being the most reactive. Furthermore, they observed significantly higher attack scores for adult *T. sirtalis* than for *T. butleri*. Schmidt and Davis (1941) considered *T. sirtalis* to be one of the more aggressive gartersnake species, noting that captured individuals defend themselves by biting and discharging a strong scent from their anal glands. Defensive behaviors of *Thamnophis* spp. have been shown to be affected by temperature, with some researchers demonstrating more aggressive behavior at lower temperatures (Fitch, 1965; Heckrotte, 1967; Arnold and Bennett, 1984), whereas Schieffelin and de Queiroz (1991) demonstrated the opposite (i.e., less aggressive behavior at low temperatures). When first encountered, *T. sirtalis* reportedly will usually attempt to flee (Hulse et al., 2001; Ernst and Ernst, 2003; Rowell, 2012), and this was corroborated in the present study. Tactile cues are readily shown to be important in the rapid change in behavior of many snakes once touched or picked up (Ford and Burghardt, 1993), and this was the case in the present study of *T. sirtalis*. For example, snakes that were initially attempting to flee quickly shifted to writhing, smearing cloacal contents and/or biting. When fleeing, the striped pattern of *Thamnophis* is highly effective at concealing motion (Ernst and Ernst, 2003). When the body is dorsoventrally flattened the pattern of alternating spots between the stripes is much more vivid (Schmidt and Davis, 1941) and when done suddenly may startle a potential predator. Thanatosis (i.e., playing dead) and caudal autotomy (Fitch, 1999) have been reported to occur in *T. sirtalis* (Schueler, 1975) but were not observed in the present study. Defensive behaviors can vary between sites. For instance, Shine et al. (2003) noted that *T. sirtalis* at some dens fled greater distances and were more likely to bite than snakes at other dens.

The defensive behaviors of *T. sirtalis* at the Hwy 832 site were similar in many ways to those of sympatric *S. dekayi* (Gray, 2015). Both species displayed the lowest diversity of defensive responses during the initial phase, and the greatest diversity of responses during the contact phase. Furthermore,

Figure 7. A bleeding laceration caused by a bite from a *Thamnophis sirtalis*.

dorsoventral flattening of the body and fleeing were the two most common responses during the contact phase for both species. Similarities were also apparent during the capture phase, where the most commonly observed response for *T. sirtalis* and *S. dekayi* was smearing of the cloacal contents. Despite the similarities, there were obvious differences. Compared to *S. dekayi*, *T. sirtalis* are more likely to flee during the initial phase, less likely to display head-hiding behavior, and will bite during both the contact and capture phases (Figure 7). Bites from *Thamnophis* spp. were classified by Weinstein et al. (2011) as level 4 of their Hazard Index—typically causing only mild lacerations, reactive erythema and edema, and rarely mild ecchymoses. Only mild lacerations were observed by me in the present study. Acquired hypersensitivity to *T. sirtalis* saliva was described by Ernst and Barbour (1989). The low yields of Duvernoy's secretions, as well as the sparse lethal potency data indicating very low toxicity, underscore the lack of any significant medical risk from *Thamnophis* spp. (Weinstein et al., 2011).

Tail loss and mortality—In a Michigan *T. sirtalis* population, Willis et al. (1982) noted a tail loss frequency of 6% in males and 13% in females. Furthermore, they observed an increase in the frequency of tail loss with size. In Pennsylvania, tail loss was reported as 12% in males and 27% in females, and was attributed to unsuccessful predation (Hulse et al., 2001). Fitch (1999) noted that tail loss was less common in males than in same-aged female conspecifics within a Kansas population of *T. s. parietalis*. Fitch also observed that larger females could more easily autotomize their tails. The above reports are in contrast to the results of my study in which tail loss was 13% in males and 6% in females. In the present study, stubbed tails were only observed in a small number of adult snakes, thus it was not possible to study the correlation between snake size and frequency of tail loss. Hulse et al. (2001) suggested that females might be at greater risk of attempted predation due to a reduction in locomotor ability when gravid. In a sympatric population of *S. dekayi* tail loss was 4% in both males and females (Gray, 2014a). While failed predation can cause stubbed tails, other possible causes exist. For instance, Ernst (2003) suggested frostbite as a cause of tail loss in *S. dekayi*. Improper shedding of the stratum corneum on the tail can result in a constriction that causes necrosis and tail-tip loss (Gray, 2014a). There is also a parasitic nematode that is known to inhabit the tail of *T. sirtalis*. When the nematode larvae emigrate to the outside from the snake's tail, a secondary infection may develop resulting in tail-tip loss (Harding, 1997). Shine et al. (1999) observed that male *T. s. parietalis* with tail loss experienced a threefold reduction in mating success. They further noted that an apparently trivial injury may impose a considerable fitness disadvantage.

Although no mortality was observed at the Hwy 832 site during the 2014 field season, a gravid female *T. sirtalis* was found crushed under a board 25 July 2013. Due to the severity of the injuries to this snake, it was determined to have most likely been the result of a person intentionally killing her. *Lampropeltis triangulum* is a known predator of snakes, including *T. sirtalis* (Ernst and Ernst, 2003). However, at the Hwy 832 site only *S. dekayi* have been known to have been predated by milksnakes (Gray, 2014a). In addition to milksnakes, potential predators of *T. sirtalis* at the Hwy 832 site include Northern Short-tailed Shrews *(Blarina brevicauda*), Virginia Opossums (*Didelphis virginiana*), Raccoons (*Procyon lotor*), domestic cats (*Felis catus*), Striped Skunks (*Mephitis mephitis*), Red-tailed Hawks (*Buteo jamaicensis*), Kestrels (*Falco sparverius*), Turkeys *(Meleagris gallopavo*), Crows (*Corvus brachyrhynchos*), Blue Jays (*Cyanocitta cristata*), and Robins (*Turdus migratorius*) (Harding, 1997; Ernst and Ernst, 2003). Humans may also intentionally or inadvertently kill *T. sirtalis* at the Hwy 832 site. A trail along the southern edge of the site is frequently used by persons riding all-terrain vehicles and motorcycles, and DOR snakes (e.g., *S. dekayi*) have occasionally been found there (Gray, 2014a).

Snake Fungal Disease (SFD) is an emerging disease of wild snakes in the eastern and midwestern United States (Rajeev et al., 2009; Allender et al., 2011; Clark et al., 2011). The most consistent clinical signs of SFD include scabs or crusty scales, subcutaneous nodules, premature separation of the stratum corneum from the underlying skin, white opaque cloudiness of the eyes (not associated with molting), or localized thickening of the skin (NWHC, 2013). Snake Fungal Disease has not yet been reported from Pennsylvania; the 66 *T. sirtalis* observed at the Hwy 832 site did not exhibit any signs of the disease. The reporting of absence data regarding SFD, along with site-specific population size estimates, establish necessary baseline data that are useful in assessing population-level impacts should future surveys from the site detect the disease.

While *T. sirtalis* is relatively common in Pennsylvania at the moment, declines have been reported for this species in Erie County (Gray, 2009) and elsewhere (Gochfeld, 1975; Gray, 2014b). Over the past 40 years habitat favorable to *T. sirtalis* adjacent to the Hwy 832 site has diminished. The construction of a flood retention basin, the development of a golf course, and the expansion of the Erie International Airport (Figures 8 and 9) relatively recently has impacted *T. sirtalis* (Gray, 2007, 2009). Seigel and Mullin (2009) noted that a lack of detailed information on snake demography remains a serious impediment to understanding snake populations and their status. These same authors also suggested that a greater understanding of the urban

Figure 8. Field habitat (left of trail) along a flood retention basin where *Thamnophis sirtalis* was common when the image was taken 7 June 2007. This site is approximately 1.6 km west of the Hwy 832 site.

Figure 9. The same field shown in Figure 8 on 31 July 2011 during the expansion of Erie International Airport's runway. *Thamnophis sirtalis* has not been observed at this site since the completion of the runway project.

ecology of snakes would encourage the cohabitation of people and wildlife in managed settings. The data presented here provide site-specific information that increases our knowledge of urban *T. sirtalis* and can be used to compare future trends in population size and structure at the Erie County site.

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Plasticity of Escape Behavior in Blanchard's Cricket Frogs (*Acris blanchardi*)

Stephen R. Johnson
Professor of Natural Sciences
Central College
812 University St
Pella, IA 50219

Mary Stark
Chair, Department of Humanities
Central College
812 University St
Pella, IA 50219

Field guides and natural history texts regarding amphibians of North America suggest that cricket frogs (*Acris crepitans* and *A. blanchardi*) display a characteristically quick shoreline return pattern of escape from predators (Johnson, 2000; LeClere, 2013; Stebbins and Cohen, 1995). In winter 2002 we observed a different form of escape behavior that we term jump, dive and return (Johnson, 2003), and at the time thought that this particular behavioral variation was somehow linked to winter conditions.

Methods

We selected a man-made pond water containment basin to explore Blanchard's cricket frog, *Acris blanchardi* (Collins et al., 2010), escape behaviors during mid to late summer of 2014. The pond has easy access, a diversity of shoreline vegetation including cattails (*Typha* sp.), water rush (*Eleocharis* sp.) and drowned grasses that grew during the recent droughts 2012 and 2013 grading into floating submerged vegetation such as pondweed (*Potamogeton* sp.) The pond edge has an initial steep grade dropping suddenly 8 inches to a low relief shelf grading into the pond making a good basking site for frogs as well as a good observation site. The pond has been a primary breeding site for bullfrogs (*Lithobates catesbeianus*), a likely frequent predator of cricket frogs (Collins et al., 2010). We made observations of cricket frogs from five separate access points to the pond's edge. Frog behavior was categorized as CSR for classic shoreline return, JDC for jump, dive and cover (with a delayed return time) and OTH for either remaining stationary on shore or jumping over the surface to a more remote location without diving beneath the surface.

Results and Discussion

During our survey we were able to observe the escape behaviors of approximately five adult frogs and over 100 juveniles and documented 59 discrete escape behaviors. Adult response to our appearance was more evenly distributed. With 19 observations of adult escape, there were 11 JDC responses (57.8%), 3 CSR responses (15.7%) and 5 OTH responses (26.3%). Juvenile responses were strongly distributed toward the JDC response. Out of 40 documented escape behaviors, juveniles chose the JDC behavior 34 times (82.9%) the CSR response 4 times (11.7%) and an OTH response 3 times (8.8%).

The distance frogs jumped in a single leap from the shore was difficult to determine. When a frog jumped near an emergent stem or leaf of offshore vegetation that distance could be measured later with a yardstick or by mental approximation. Blanchard's cricket frogs are noted for meter-long jumps (Vogt, 1981). Most frogs engaging in the JDC behavior had an initial jump length of about 2 to what appeared to be slightly more 3 feet. These frogs immediately submerged and became stone still before undergoing a slow and submerged return to shore.

We observed an adult return to shore after 15 minutes of submergence. Two adult responses were timed out at 30 minutes with no frog evident on the shoreline. These times were similar to that of the frog observed in the winter of 2002. Another adult performed the JDC behavior, returned to shore after 40 minutes and within approximately 5 min of return began to call. A second adult performed a JDC behavior, returned after 20 minutes, then after seeing us a second time, performed the CSR response. We later found that the frogs slowly and quietly returned to shore from beneath submerged vegetation. Among juveniles, three were observed emerging from beneath vegetation onto the shore. One returned in 10 minutes, another returned in 8 minutes and the third returned in 10 minutes. This may suggest that juveniles might be metabolically unable to stay submerged as long as older juveniles or adults.

Since the JDC response is so frequent and so different from the CSR response, we wondered why might be so frequent. The pond has no large predatory fish, the likely cause for the CSR response (Stebbins and Cohen, 1995). The CSR response may be less important in a fishless pond. The chief predators for adult frogs are probably bullfrogs. But since bullfrogs are attracted by sound and movement, either JDC or remaining motionless might be sufficient. Another predator, the fishing spiders (*Dolomedes*) may be a good candidate for promoting the JDC response. We observed two large 0.5 to 0.75 inch dark spiders on the shoreline that likely were the dark fishing spider (*Dolomedes tenebrosus*) (Emerton, 1902, Howell and Jenkins, 2004). These spiders hunt by sensing vibrations and also by touch (Foelix, 2011). *Dolomedes* may stealthily approach the shoreline and if a frog senses it and performs a quick CSR, the frog may return to find the spider still present. Furthermore since a large shoreline spider such as the six-spotted fishing spider (*Dolomedes triton*) does consume frogs, has been observed eating Blanchard's cricket frog (Johnson, 2000), and can sense minute water surface waves associated with frogs moving in water (Bleckmann and Lotz, 1987), the waves generated by the CSR may likely attract the spider. However, if the frog engages in the JDC behavior and delays its return to shore by 8 minutes the spider may lose interest and search for prey elsewhere. Spiders would very likely lose interest after 30 minutes. The distance from shore and the submergence of the frog may aid this hypothetical escape as well—a frog merely hopping out onto thick vegetation may land near a bullfrog or be followed by a fishing spider. Might the slow and submerged return of frogs also be an adaptation to thwart wave-sensitive spiders? Other, larger, possible predators that search by sight and smell such as raccoons and skunks (Collins et al., 2010) may also drive the JDC escape response. And as larger mammals these may be what the frogs assumed that we the observers were.

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What You Missed at the April Meeting

John Archer
j-archer@sbcglobal.net

On January 1, 2015, the Illinois Herptiles-Herps Act became law. Google "510 ICLS 68" and you can read it. And you should. If you keep, breed, or sell herps in Illinois or if you field herp in Illinois, this law probably has something that affects you. No one I know likes new laws, but as interest in our hobby and profession grows, the potential for people doing the wrong thing grows. As more people create more problems we get more laws. Scott Ballard, biologist for the Illinois Department of Natural Resources, wrote the new law and your society invited him to speak at our April meeting. We had a chance to ask questions and delve into Scott's thinking when writing much of the law. Even if you will never set foot in the state of Illinois, it may be of interest to you to explore a little of the background.

DNR biologist Scott Ballard. Photograph by Dick Buchholz.

Scott started by making some general comments and then exploring what he felt were the parts of the new law that held interest for our group. Reptiles and amphibians have been removed from the Dangerous Animals Act, the Fish and Aquatic Life Code, and the Wildlife Code and condensed into the new act. Scott hopes that reptiles will no longer have a "dangerous animal" connotation because they are certainly not in the same category as lions or bears. While the administrative rules should be published in a few weeks, because the new law must be integrated with the Illinois Endangered Species Act some of the law will not be finalized until August, 2015, and trouble with the electronic forms required for the new law means that enforcement of the new permit system and fees may be postponed until January 1, 2016.

The new law has not changed the possession limit of a maximum eight total indigenous taxa per person and max of four of any one taxon per person. Scott referred to "taxa" because the rules will go to subspecies when possible. He did mention that if you share living quarters with someone, that person also is entitled to possess indigenous herps up to those limits. To collect, one needs a valid fishing license and one may not legally collect in state parks. On private property one must have the landowner's permission. In answer to a question, Scott said that baiting herpers who are road cruising—as is being done in some western states—is not being done in Illinois. But you may be watched in the LaRue-Pine Hills area. If one legally collects an animal that is gravid, the young must be returned as soon as possible to the site of the adult capture.

Commercialization and breeding of Illinois indigenous taxa will require keeping paperwork and issuing receipts, as well as having the proper permits. Breeding and selling any indigenous herp taken from the wild is still illegal, and the only way to prove that an indigenous animal was not wild-caught in Illinois is to have a proper receipt. The DNR wants to maintain a definitive paper trail of all commercial activities and there will be fees associated with breeding and selling. Wherever possible, Scott tried to eliminate requiring multiple permits. For instance, if one has an endangered species permit, a herpetoculture permit is not required.

Scott mentioned some of the problems he faced in writing the law. He would have liked to ban all turtle racing, but that turned out not to be politically feasible. The new law does ban turtle racing in counties where ranavirus is documented. Head-starting has new rules that require plans and documentation.

He intentionally kept some areas vague because too much detail can limit flexibility. For instance, some animals require an "escape proof" cage. Scott defined escape proof by simply saying that if the animal escapes, it was not in an escape proof cage. He attempted to allow reptile shows such as ReptileFest enough latitude to display larger or what might be considered dangerous animals with the safety of the animal and the public in mind. Special use permits will allow and be needed for the keeping of some venomous animals, crocodilians, and some monitors and will require a fee, as will other permits.

Scott reminded us that this is a state law and county or municipal rules may be more restrictive. It is still important to check into local laws. I have deliberately avoided an attempt to repeat the law in this article because if you're into reptiles and amphibians, you need to read it—and the administrative rules when they are published. I would have to simply cut and paste in order to insure accuracy. Having said that, if there are errors in this article, they are my fault alone as a result of misinterpreting Scott's talk.

So, how to you find the answer to that burning question that you have? Scott Ballard recognizes that people will have questions and he's promised to answer any that come his way. If you have an unusual situation or simply need a clarification, Scott's email is Scott.Ballard@illinois.gov and his cell phone number is 618-694-3398. He encourages you to contact him.

This new law obviously took a lot of Scott's time and effort and he attempted to convince us that he was as fair as possible in its writing. We really appreciate him taking the time to come to Chicago and directly address those of the audience that had questions. I still don't like new laws, but perhaps this is as fair and well thought out as a new law can be.

Unofficial Minutes of the CHS Board Meeting, April 17, 2015

President John Archer called the meeting to order at 7:52 P.M. Board members Rachel Fessler, Ed Huether and Brandon Ottolino were absent.

Officers' Reports

Recording Secretary: Erica Mede read Rachel Fessler's minutes from the March meeting. Corrections will be sent to Rachel and will be approved after corrections of names.

Treasurer: Mike Dloogatch gave the financial report. Cancelling ReptileFest will negatively affect our net income this year.

Corresponding Secretary: Ed Huether was not present but sent his report via Facebook Messenger. Ed sent a thank-you note to speaker Danny Mendez. A thank-you has not been sent to the April Jr. Herper speaker yet. Erica gave him a supply of CHS stationery.

Publications Secretary: Aaron LaForge updated the website with the speakers. He still requires information on shows we will be at to keep everyone up to date. Announcements of the grant awards have been added as well. PayPal notifications should now be going to the membership secretary.

Sergeant-at-arms: Dick Buchholz informed the board that there were 25 people at the March meeting.

Committee Reports

Shows: Molly Carlson has resigned as Show Coordinator. Dick Buchholz will take over the position.

- Notebaert Nature Museum, first full weekend of each month.
- All Animal Expo, bimonthly.
- Wild Night at Garfield Park Conservatory, April 22, 4–7 P.M..
- Turtle Day at Cosley Zoo, Wheaton, May 23, 9 A.M.–1 P.M.
- Rockin' for Reptiles at Midwest Museum of Natural History, Sycamore, June 27, 11 A.M.–3 P.M.
- Green Fair on the Fox, Batavia, August 8, 9 A.M.
- Bug Fest at Red Oak Nature Center, Batavia, August 22, 9 A.M.–2 P.M.
- Westmont Pet Parade, September 14, 9 A.M.–2 P.M.

Donation jar is doing well. Dick will make sure that Aaron LaForge is given future contact information for all shows. Discussion commenced regarding reimbursement for volunteers at shows such as the All Animal Expo. Erica Mede requested a binder be created of past minutes that will be available for board meetings to resolve such issues. John tabled discussion on official reimbursement policy until the treasurer was available. Dick Buchholz moved that $10 per volunteer who stays for the duration of a show will be allocated for a meal. The motion passed unanimously.

Adoptions: Colleen Schwarz stated that there will be no changes made to how CHS performs adoptions.

Junior herpers: Rich Lamszus commented on the Brookfield Zoo trip. The field trip was completely full with 34 members in attendance. The field trip was a complete success and will most likely be repeated if Brookfield will support the endeavor again. The next meeting will be about Responsible Herping with the speaker to be announced. Colleen wants to start structuring the Jr. Herper meetings to allow older children to teach the younger. Colleen and Rich both feel that finding speakers is very difficult. They will be offering a special speaker once every quarter and the other two meetings will be focused on topics and group discussion. Bailey Cook will be speaking in June.

Old business

Letters for donations to raffle: Ed Huether gave his update via Facebook Messenger. Letters of solicitation were sent out to Zilla, ExoTerra, ZooMed, Petsmart, Petco, and Pet Supplies Plus. Ed has also met with his old district manager for Petco and discussions with the regional manager will be started.

Herp of the Month: This month's theme will be "Outdoors" and last month's winner was Patrick Carroll.

Storage options: Mike D. gave John Archer the registration for the trailer. The situation with respect to renting space is at a standstill.

Nominating Committee: Jim Foster will Chair the Nominating Committee. Teresa S. and Mike D. will serve as well.

Raffle at General Meetings: Dick B. suggested that a reformatting of the raffle is needed. John A. suggested offering only 6 items with one larger item available so that everyone isn't a winner.

New Business

ReptileFest: John thanked Nancy Kloskowski, Mike D. and Teresa Savino for joining him at UIC to help calm any patrons who had not gotten word of the cancellation. John urged board members to continue the search for appropriate venues. We need at the very least 35,000 sq. ft.

John would like to print flyers for Scott Ballard's talk and promote it on social media. This should be done for all speakers.

Mike D. wanted to discuss that the CHS does **not** promote free-handling of venomous snakes. This was brought up due to Rich Lamszus re-posting a Tom Crutchfield post regarding free-handling not being a problem. Rich explained that it was meant to be a message of unity, not supporting free-handling itself. John stated that the CHS needs a position statement regarding free-handling, described as an individual handling a venomous snake without hooks or tongs. Mike D. moved that the CHS have an official position that reads, "The CHS opposes the free-handling of venomous reptiles for any purpose." The motion passed unanimously.

Round Table

Rich went to a preschool with Colleen to give hands-on experience with reptiles.

Erica Mede will be getting married in May 2016!

Meeting adjourned at 9:34 P.M.

Respectfully submitted for the recording secretary by Erica Mede

Advertisements

For sale: **highest quality frozen rodents**. I have been raising rodents for over 30 years and can supply you with the highest quality mice available in the U.S. These are always exceptionally clean and healthy with no urine odor or mixed in bedding. I feed these to my own reptile collection exclusively and so make sure they are the best available. All rodents are produced from my personal breeding colony and are fed exceptional high protein, low fat rodent diets; no dog food is ever used. Additionally, all mice are flash frozen and are separate in the bag, not frozen together. I also have ultra low shipping prices to most areas of the U.S. and can beat others shipping prices considerably. I specialize in the smaller mice sizes and currently have the following four sizes available: Small pink mice (1 day old—1 gm) , $25 /100; Large pink mice (4 to 5 days old—2 to 3 gm), $27.50 /100; Small fuzzy mice (7 to 8 days old—5 to 6 gm) , $30/100; Large fuzzy mice / hoppers (10 to 12 days old—8 to 10 gm), $35/100 Contact Kelly Haller at 785-234-3358 or by e-mail at kelhal56@hotmail.com

For sale: Captive-bred Rosy Boas. Forty-year C.H.S. member is selling 2011 and 2013 healthy and excellent feeding offspring. Special "cheap" prices to C.H.S. members. Arrangements can be made for delivery to southern Wisconsin or northern Illinois. Phone (608) 427-3864 or email zartenfour@mwt.net.

For sale: Standard 24" Neodesha reptile cages, 3 × 6" vent on top, tempered glass front. Like new condition, no burns or stains, original glass. These cages do not have the dam (horizontal molding that crosses the entire front width of the cage, used to hold back bedding material)—easier to clean without the dam. About 20 currently available, $45 each. Linda Malawy, (630) 717-9955, linda_malawy@hotmail.com.

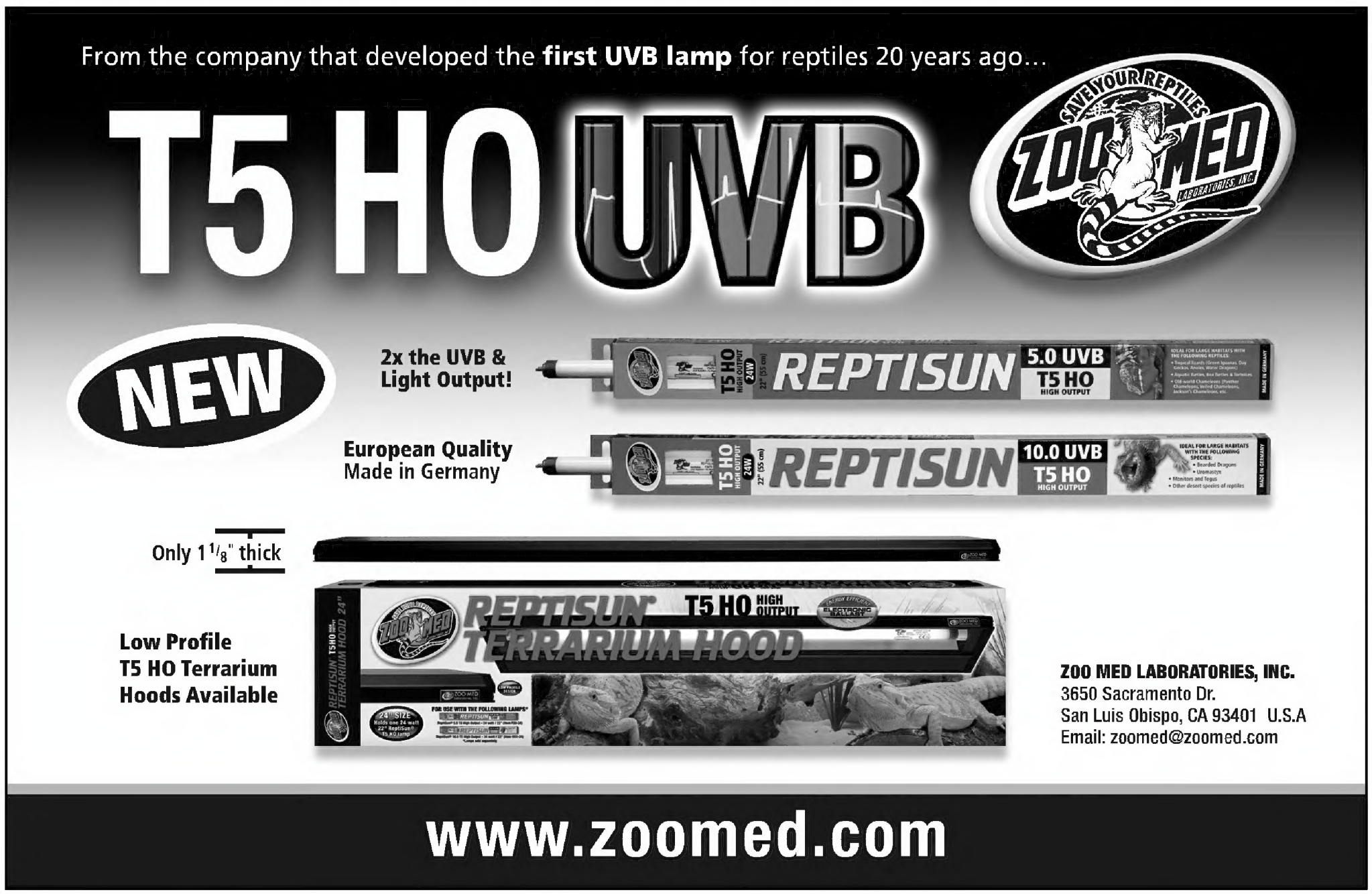
For sale: High quality, all locally captive-hatched tortoises, all bred and hatched here in the upper Midwest. Baby leopards, Sri Lankan stars, and pancakes usually available, and are all well-started and feeding great! Leopards are $125 ea., Sri Lankans (2012 hatched) $475 ea. And Pancakes are $195 ea. Leopards for out of state sale/shipping require a veterinary health certificate (inquire for cost). E-mail at KKranz1@wi.rr.com or call Jim or Kirsten at 262 654 6303.

Herp tours: **Costa Rica herping adventures**. Join a small group of fellow herpers for 7 herp-filled days. We find all types of herps, mammals, birds and insects, but our target is snakes. We average 52 per trip, and this is our 10th year doing it. If you would like to enjoy finding herps in the wild and sleep in a bed at night with air-conditioning, hot water and only unpack your suitcase once, instead of daily, then this is the place to do it. Go to our web-site http://hiss-n-things.com and read the highlights of our trips. Read the statistics of each trip and visit the link showing photos of the 40 different species we have found along the way. E-mail at jim.kavney@gmail.com or call Jim Kavney, 305-664-2881.

Herpetological researcher/educator internships! Research 4 Reptiles, LLC. is seeking 1–2 volunteer interns, ages 18 years and older, for the Summer 2015 season to assist in all aspects of herpetological research and educational classes. Our mission is to provide challenging, hands-on, field-based programs for participants ages 10 years and older to inspire enthusiasm for and understanding of native Illinois reptile and amphibian species. All educational programs are taught entirely outdoors at Midewin National Tallgrass Prairie in Wilmington, Illinois, and are limited to 8 participants. Internship details can be found on our website at *www.research4reptiles.biz*. Email Holly Zak at research4reptiles@comcast.net or call 630-337-0757 for questions.

Herpetological research classes! Looking for a fun and educational adventure this summer? Research 4 Reptiles, LLC. offers herpetological research classes for ages 10 years old to adult. Choose from *A Field Study of Turtles*, *A Field Study of Frogs*, *General Herp Survey*, *Family Tour*, or *Herp Research Study for High School & College Students*. All educational programs are taught entirely outdoors at Midewin National Tallgrass Prairie in Wilmington, Illinois, and are limited to 8 participants. Visit our website *www.research4reptiles.biz* for details and registration information or call Holly at 630-337-0757.

Line ads in this publication are run free for CHS members—$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to mdloogatch@chicagoherp.org.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UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, May 27, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **Don Becker**, developer of the HerpMapper website and mobile app, will speak about "Citizen Science and Why It's Important." Don has had a life-long passion for herpetofauna conservation and public education. He volunteers with various conservation organizations to manage and restore habitat, educates the public about the importance of herpetofauna, and conducts herp surveys and inventories. Don will be assisted in this program by Justin Michels and Peter Berg.

The June 24 meeting will be our popular and always well-attended annual **Show & Tell** meeting. Bring an animal that you find interesting for one reason or another and be prepared to give a short (under five minutes) presentation to the group. Don't be shy. Neither age (yours) nor commonness (the animal's) should be a limitation..

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

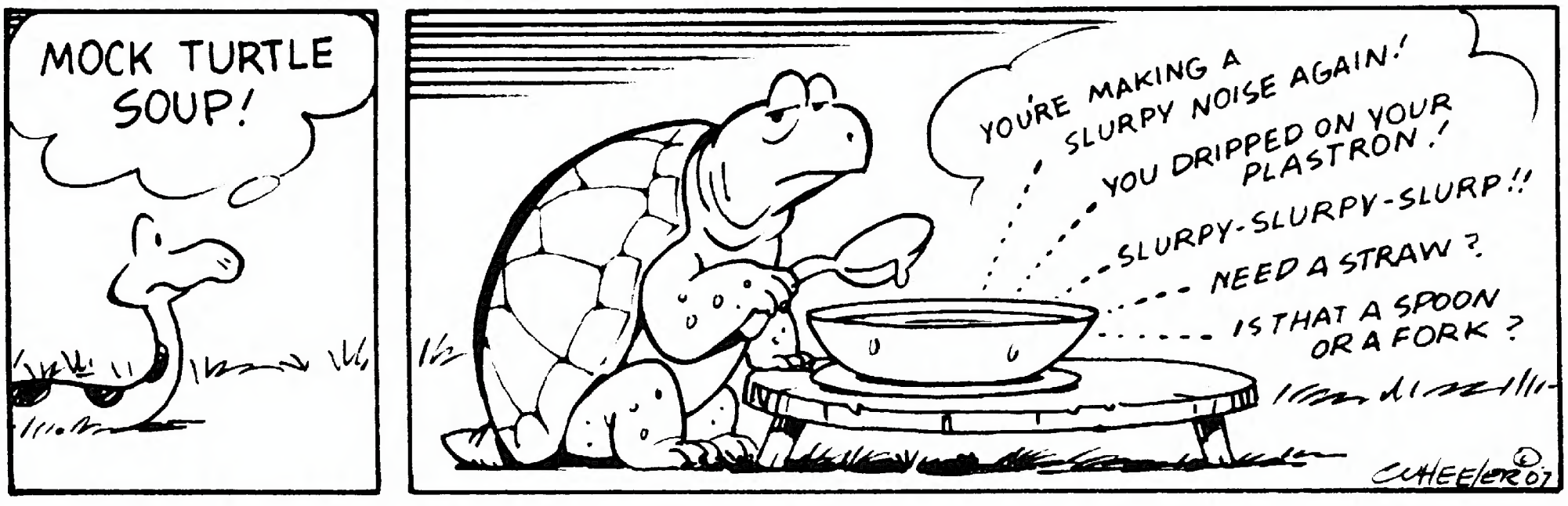
Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the next board meeting, to be held at 7:30 P.M., Friday, June 12, 2015, at the Schaumburg Township District Library, 130 S. Roselle Road, Schaumburg.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the group's Facebook page.

THE ADVENTURES OF SPOT



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